EMOTIONAL MACHINE ORCHESTRATOR

By Point of View

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THE SMALL PROBLEM

- Many text generation platforms are apathetic or unpredictably emotional. It would be useful to be able to generate specific emotional text.

- This could be useful for chatbots presenting a specific emotion or for realistic emotional dialogue creation.

THE BIG PROBLEM

- A major goal of AI Practitioners is to create a system that can generate creative fiction.

- A subset of this work would be the creation of a dialogue system that builds on specific character archetypes and situations.

- Emotional modeling could be used in conjunction with personality modeling, dialect modeling, etc. to build distinctive characters and to create a story trajectory that is meaningful.

OUR SOLUTION

- We built a package of six different emotional text generation models, collectively referred to as EMO: Emotional Machine Operator.

- Each model is associated with a specific emotion

1. Happiness   2. Sadness   3. Fear
4. Disgust   5. Anger   6. Surprise

USING THE MODEL

Option 1: An emotion is designated > A "Call" is entered as an input > Multiple options for "Responses" are displayed

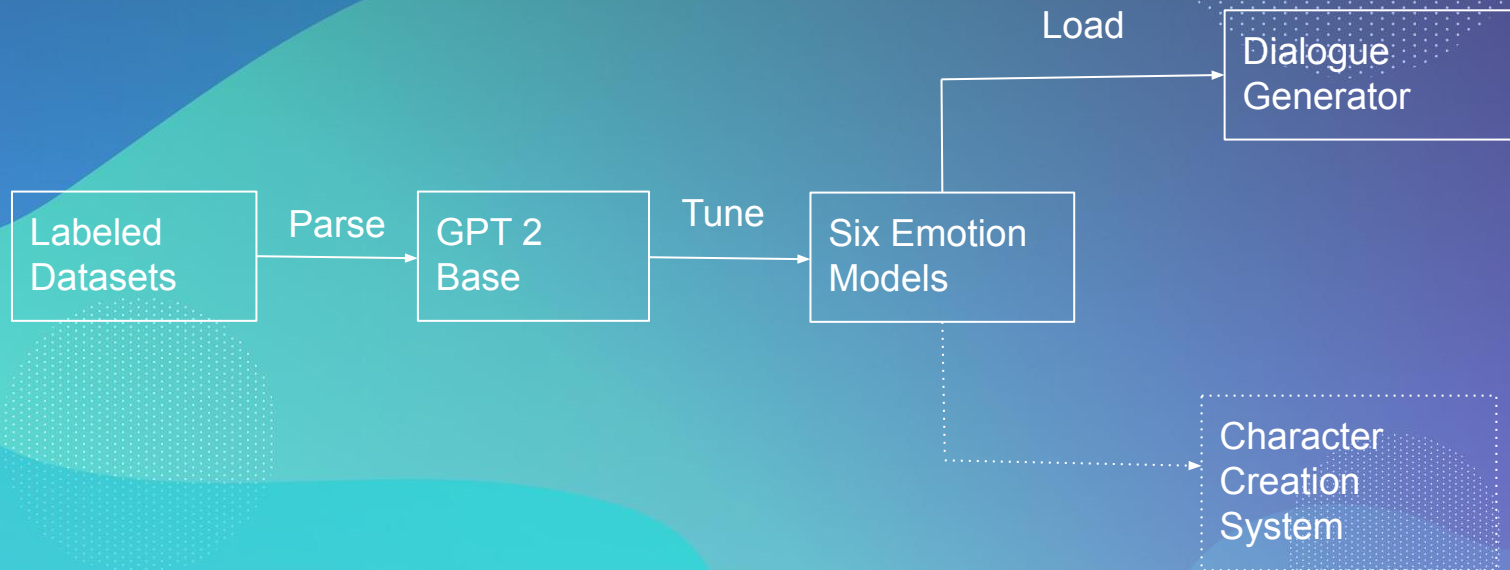**Option 2:** An arc of emotions is designated > A "Call" is entered as an input > A single set of dialogue following the emotional arc is displayed

DEMO: Tackling the Small Problem

PIPELINE

Labeled Datasets →(Parse)→ GPT 2 Base →(Tune)→ Six Emotion Models →(Load)→ Dialogue Generator

Six Emotion Models ⋯→ Character Creation System

DIVING DEEP

- Preliminary research to determine which emotions to include

- Models are built on GPT-2, a tunable open source language model from OpenAI

- Combined two datasets to finetune our models

- Optimized our tuning using quantitative data results.

- Developed a Python script that accepted a set of emotions and loaded our EMO models to create a dialogue.

CHALLENGES

- Navigating GPT-2

- Time constraints of fine-tuning GPT-2

- Sourcing sufficiently large, detailed datasets (right)

- Optimizing GPT-2-simple's fine tuning parameters

- Increasing context-guided content of responses

FUTURE WORK

- Fine tuning GPT-2 on larger data sets and/or using automated sentiment analysis to generate larger, more diverse training files

- Evaluating accuracy of generations with automated sentiment analysis

- Increasing tolerance of multi-line input

- Using fine tuned models to create a framework for building full scripts

- Engaging in more ethical analysis of potential (mis)use cases

- Lots more!

FURTHER READING / SOURCES

- OpenAI's GPT-2

- Mark Woolf's gpt-2-simple setup

- Datasets: EmotionLines and DailyDialogue

- YouTuber Tom Scott uses GPT-3 to generate video ideas

- Readings on ethical considerations:

  - On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?

  - Training a single AI model can emit as much carbon as five cars in their lifetimes

BONUS SLIDES

VALIDATION: Training Data & Joyful Model

- At *temperature* = 0.9, in a batch of *n* = 20 generations of the joyful model:

  - about 64% of generated utterances are not identical to utterances in the training data
  - about 95% of generated utterances are not identical to other utterances in the batch

	A	B	C	D	E	F	G
1	**Fintuned Model**	**steps (fintuning)**	**nsamples**	**temperature**	**prefix**	**SELF - % unique**	**TRAIN - % unique**
2	Combined_CR_happiness					85.70%	(BASELINE)
3	Combined_CR_fear					86.89%	(BASELINE)
4	Combined_CR_sadness					91.27%	(BASELINE)
5	Combined_CR_anger					89.02%	(BASELINE)
6	Combined_CR_disgust					94.12%	(BASELINE)
7	Combined_CR_surprise					87.18%	(BASELINE)
8						89.03%	
9	Combined_CR_happiness: test_run_2...	500	20	0.9	New Zealand	100.00%	67.86%
10	Combined_CR_happiness: test_run_3...	500	20	0.9	New Zealand	96.30%	70.37%
11	Combined_CR_happiness: test_run_4...	500	20	0.9	New Zealand	92.00%	64.00%
12	Combined_CR_happiness: test_run_5...	500	20	0.9	First day	93.33%	66.67%
13	Combined_CR_happiness: test_run_6...	500	20	0.9	First day	100.00%	53.33%
14						96.33%	64.45%

SAMPLE TRAINING DATA

📄 Combined_CR_sadness.txt

```
- - -
C: First we will take some x-rays and see what we're dealing with. I also noticed a small cavity up
front here, so you are going to need a filling.
R: I guess that's what I get for not flossing or brushing my teeth three times a day.
- - -
C: Yes, what can I do for you?
R: I had a skydiving accident over the weekend and won't be able to come to school today.
- - -
C: Yes, how can I help you?
R: I ran my car into a tree yesterday and need to miss a few days of school.
- - -
C: So, how are you feeling today?
R: I'm pretty tired. I haven't been sleeping well.
- - -
C: What time do you usually go to bed?
R: I don't have one time in particular. I just go to sleep whenever I feel tired.
- - -
C: Have you been under a lot of stress lately?
R: I just lost my job, and I am unsure about being able to find another one.
- - -
C: Has anything in your day-to-day life been bothering you lately?
R: I am worried about how I am going to pay my tuition.
- - -
C: Have you had any unusually stressful situations in your life lately?
R: My mother just passed away last Tuesday.
- - -
C: What are you doing?
R: Look at me. I look so old! I look as if I were thirty.
- - -
C: Wow, Arthur! You're as blind as a bat!
R: Yeah, I know, my vision is really blurry at times.
- - -
```

📄 Combined_CR_surprise.txt

```
- - -
C: Yes, that's for the units.Installation would probably be another 700 to 1000 dollars.But it depends on
the time spent, of course.
R: You mean installation isn't included? I'm very surprised.
- - -
C: Not today.
R: What do you mean?
- - -
C: I went into the bank with my money, and I looked at the exchange board.At first I couldn't believe it. I
thought I was reading the board wrong or something.
R: Why?
- - -
C: Why?
R: Because the board said 60 pesos for every Taiwan dollar.
- - -
C: I thought it was wrong too. It didn't make sense.
R: Just two days ago it was 35. How can it be 60?
- - -
C: So, I went up to the teller and started to exchange the money. And it's true.They really gave me sixty
pesos for the dollar.
R: That's amazing! Really? How could it change so much in two days?
- - -
C: That's easy. It was your office ergonomics that decided me.
R: You're kidding! Something as simple as that?
- - -
C: I hate to be the bearer of bad news, but it's that time of year again. Have you got your performance
evaluations finished yet?
R: Oh no! Evaluations! You can tell that's not my favorite job ; I haven't even started yet. When is the
deadline for turning in thecompleted forms?
- - -
C: Yes, furthering my education is already bringing about positive results in my workplace as it has
boosted my confidence.As well the tutoring system my school employs offers courses uniquely suite
R: Really? That's great that you found a school that puts your need first.
- - -
```

Given a call as input ("C: … "), we want each fine tuned model to generate a response ("R: … ") that is characteristically joyful, sad, fearful, angry, disgusted, or surprised.

JOY

Oh, good. You're going to see a lot of people from your country, who are very interested in travelling to the world's oceans.

R: You're so lucky.
R: It sounds like fun.
R: Oh, that's wonderful!
R: It's delightful to be in the country.
R: Oh, that's wonderful. I really hope you can make it to visit her in time.
R: That's great. I'm very interested to know what she's up to.
R: That's great. Would you like to meet him?
R: Oh, what's that like?
R: Oh, congratulations, congratulations!
R: Don't worry. I'm free next Monday.
R: It's a beautiful time to be a New Zealander! I hope you're bringing along a good trip souvenir.
R: Oh, I see. Well, if you'll excuse me, I should be back by then.
R: It sounds like a good trip!
R: How's your trip going?
R: You are so lucky! I hope to see you again.
R: That's terrific!
R: Yes, it's excellent!
R: Oh, that's great. I just searched on the internet.
R: What a coincidence!
R: That's perfect. You'd have to come with me.
R: Wow, what a beautiful trip!
R: We should come to a game, too.
R: Oh, I see.

SADNESS

So sorry, I'm out of sorts at the moment.

R: It's rainy weather today and I feel a little bit let down by the scenery.
R: Hey, chill out, I'm just trying to help.
R: So sorry, I must have been watching the news.
R: It's rainy weather today and I have to go to the store to change my rain blouse.
R: And I find it's the kindest thing to do.
R: And I'm 18 months old.
R: It's just too hard-hitting and depressing.
R: and I have to tell you that I loooove it.
R: So, I'm gonna miss you too.
R: Hey, I'm sorry, I haven't seen you for a long time.
R: So sorry, I gotta go break up with Bonnie now.
R: I am sorry, I'm too tired now. I go to sleep when I see the red light.
R: I'm sorry, I'm going to meet some friends there.
R: And I am worried about my visa.
R: So sorry, I must have been looking for you.
R: Hey, I'm sorry, I-I didn't know. Hey, come on.
R: And I feel a little sad because like, thirty yuan or something.
R: And I'm 18 right now and I have to leave it so I can't return it to you.
R: I'm sorry, I'll be here until 10 again tonight.
R: Hey, if you can wait until tomorrow night, I'll go with you.
R: I am sorry, I just. Look, I-I'm gonna be back to my room in as little as a second.
R: I'm sorry, I was really looking forward to this.
R: And I wonder if I could borrow the car from here instead of going to the airport.

ANGER

Are you crazy? You're losing out on a great opportunity here...

R: Come on! Why are you so bitter?
R: Wait a moment, mom.
R: Waiter! I can't believe it! I can't believe it! I've been so busy
R: Wait a moment, her name is Nellie? Don't you know her?
R: Are you crazy? Youandroid?
R: Come on! Why are you so bitter?
R: Egg! I'm not allowed here.
R: Wait, who's coming to visit you, then?
R: Where? bawl!
R: Come on! Why are you so bitter?
R: what?!
R: Come on! Why are you so bitter?
R: Come on! Why are you so bitter?
R: Egg! I told you.
R: Waiter! I don't understand!
R: Egg! I'm totally nuts! I must be attacked by rabid cats!
R: Come on! Why are you so rude to your wife?
R: Waiter! I don't understand!
R: Nooo! Nooooo! Noogie! Stop it! It's expired!
R: You have to be kidding me! Go away! Stop having so many funny pictures!
R: Ross, I'm sorry, but I'm not going to be in touch with that horrible old lady in the tree.
R: Hey, honey! Don't squeeze it so hard!
R: Noo!! I don't care! I'm not, the wires have come loose in your head!
R: Hey, that's not a good look on your part!
R: Nooo! Nooooo! Noogie! Sing!

SURPRISE

Oh my God! So you're gonna stay here with me?

R: Oh, really?
R: Oh. I have your aunt's itinerary.
R: Oh, my□s Taiwan!
R: Oh my God! How the hell do you do that?
R: Oh really?
R: What?! Look how crazy it is to live in a world of this size.
R: Oh, my God! What a great way to start a new year! How did you know we were going to Huntington Beach?
R: Oh really?
R: Oh, really?
R: Oh my God! I have an uncle in Thailand.
R: You told me in advance you were going to visit.
R: Oh, really?
R: Oh, really?
R: Oh really? Are you in Taiwan?
R: Oh my God! What's she doing here?
R: Oh, my.
R: Oh really?
R: Oh, my God! What a horrible guy.
R: Oh no! What do you get out of this?
R: Oh, really?
R: Oh, really? I hope you are going with her.
R: Oh really?
R: You told me in advance you were going to visit, that you were going to visit all over the world.
R: Oh, really?
R: Oh, really?
R: Oh, my.

FEAR

She's such a pain in the neck!

R: She is really pretty, isn't she? Her skin looks so baby-smooth!
R: Is it really your turn this week?
R: You are not very funny!
R: It's a pleasure to meet you.
R: She's almost medium.
R: It's no use complaining.If we had got enough money, we wouldn't put up with it!
R: You are driving me up the wall.
R: Is this a restaurant that you want to come back to?
R: What a terrible thing to do!
R: Her husband is a fat cat!
R: Just like yesterday. She's making me sick.
R: She lives just off the coast!
R: She's really pretty, isn't she? Her skin looks so baby-smooth!
R: She said she was too excited to go to sleep.
R: She's really pretty, isn't she? Her skin looks so baby-smooth!
R: She's very sick. I'm just coming from the hospital.
R: She's gone missing.
R: She's very sick. I'm just coming from the hospital.
R: It's a pleasure to meet you.Happy to help you out!
R: She's such a pain in the neck!
R: It's a terrible thing to do in my native tongue.
R: Sorry to trouble you. But I don't think it's right.
R: She's very sick. I'm just coming from the hospital.
R: She's here with a bunch of pot bellies who all smell bad. Sorry to trouble you. But I don't think this fish is fresh. It actually tastes a bit off.

DISGUST

Oh, how awful!

R: She's really nice, isn't she? Her smile is killer!
R: Is it really your turn to be frank?
R: She's gone to get drunk.
R: She said she was too excited to go to sleep.
R: She's here with her husband. And they've got out of control.
R: You are not very funny. I doubt you will become friendly with me again long.
R: She's very sick. I'm sure she'll be soon die.
R: Can you imagine what would be like if we had got into this game?
R: She's such a pain in the neck!
R: She's here with three weeks leave.
R: She's really pretty, isn't she? Her skin looks so baby-smooth!
R: She's a terrible gossip.
R: She's really pretty, isn't she? Her skin looks so baby-smooth!
R: She's going to be seeing her.
R: It's a pleasure to meet you.Love!
R: What a terrible thing to do!
R: You are not very funny. I can't believe I married a woman like you.
R: It's a pleasure to meet you.
R: It's a very bad idea.
R: She's too excited to take a nap.
R: She is very pleased with me.
R: It's no use complaining.If we met face to face, he would certainly get along with me.